

Major Precipitation Event across Southern California in December 2010

Alex Tardy

Moisture began to increase across the east Pacific during the middle of December 2010. After December 15 a storm system started drawing this moisture into Southern California and light precipitation began across the San Bernardino Mountains. The precipitation increased over the mountains and light rain occurred in the lowlands and coast on Thursday and Friday December 16 and 17th. By Friday night, 1 to 3 inches of precipitation had occurred across the San Bernardino Mountains and snow levels were near 8000 feet.

Deep moisture was evident on satellite across the east Pacific over the weekend of December 17th and 18th. Two significant surges of precipitation moved onshore during this period and brought steadier widespread rainfall across Orange County and the Inland Empire. Rainfall rates up to 0.30 inches occurred across the south facing slopes of the San Bernardino Mountains. By Sunday evening, total precipitation reached near 10 inches in Lytle Creek and the first significant flooding commenced. Runoff from the mountains also sent high waters into the Whitewater drainage bringing down boulders and large amounts of mud. Satellite imagery depicted anomalously high moisture levels across Southern California that extended southwest into the tropics.

On Monday December 20th, the storm system remained anchored over the eastern Pacific and had moved little. The main storm system began to move towards the West Coast and tapped into the high moisture plume that existed across Southern California. Two surges of heavy rain moved into Orange County and spread southward over San Diego County. Rainfall rates increased significantly to 0.50 to 0.75 inches per hour across the high terrain and up to 0.25 inches in the valleys. This caused more flooding on Lytle Creek where it left its banks and caused water to cross on ramps. Landslides began on Monday and continued into Monday night when several rescues were required due to high water flows across the entire area. Snow levels on Monday remained above 8000 feet but lowered to 6500 feet on Tuesday. Total precipitation amounts reached just over 20 inches in parts of the San Bernardino Mountains and 2 to 5 inches in San Diego County. The last significant and heaviest surge of precipitation moved into extreme southwest California during Tuesday afternoon and continued into Wednesday morning December 22, 2010. This rainfall brought 2 day totals near 4 inches in downtown San Diego and 5 to 10 inches to most areas. The steady rainfall tapered off Wednesday morning with additional showers and isolated thunderstorms that continued into Wednesday evening. Significant flooding occurred in San Diego County Tuesday night and Wednesday when the San Diego River rose to just over 14 feet.

Major landslides and flash flooding affected the communities of Laguna Beach, Apple Valley, along the Whitewater Channel in the Coachella Valley near Palm Springs, Highland, Corona, Loma Linda, La Jolla, and the city of San Diego from Tuesday into early Wednesday December 22th. Rainfall totals of 5 to 10 inches were widespread along the coast and inland valleys. The mountains of San Diego to San Bernardino received totals of 10 to 28 inches, highest in Lytle Creek drainage. Heavy wet snow accumulated above 6500 feet with amounts over 6 inches and as much as near 2 feet above 7500 feet.

FACTS

Location	Impact	Damage
High water rescues	High water	County cost
Several in high waters across San Diego County	River and flash flooding	County cost
Major businesses Laguna Beach	Floods up to 4 feet deep on Broadway	Lower levels significant
Coachella Valley golf courses	Floods	Major
Whitewater channel	Peak 17,000 CFS Tuesday	Golf courses and roads
Lytle Creek Wash Bridge	High water and debris flows	Severe to bridges
San Bernardino County	Slides, debris flows and floods	5 homes destroyed
Corona Airport	Santa Ana	Hangers
Qualcomm Stadium (NFL)	Inundated	2 feet deep
Mission Valley, Fashion Mall	Inundation	Cars under water, streets flooded
Santa Margarita River	Exceeded flood stage	Flooded areas, gauge broke at 9 feet
San Diego River	Moderate flood to 14.1 feet and 10,000 CFS, highest since 1980	Widespread flooding, road closures and some evacuations
Mojave River	Exceeded flood stage to 18.8 feet and 28,000 CFS	Major levee, fields, few homes and road damage
City Creek and Santa Ana River	High water levels	Road damage and erosion
December 2010 precipitation in southern California	300 to 800 percent of normal precipitation, highest mountains	Exceptional values

7 day precipitation through December 23, 2010

Location	Amount (inches)
San Bernardino Crestline	28.71
Lytle Creek	26.46
Santiago Peak	22.00
Upper Silverado Canyon	20.79
Palomar Mtn	18.66
Silverado	17.94
Wrightwood	14.97
Big Bear Lake	14.29
Santa Rosa Plateau	13.89
Idyllwild	13.18
Mission Viejo	13.07
Temecula	12.99
Fallbrook	12.49
Alta Loma	12.44
Rialto EOC	12.12
Laguna Niguel	11.56
Lake Elsinore	11.53
Upland	11.29
Bell Canyon	10.51
San Bernardino	10.78
Tonner Canyon	10.37
Yucaipa	10.19
Beaumont	9.60
San Clemente	9.46
Santa Ysabel	9.39
Julian	9.15
Newport Beach	8.90
Hisperia	8.88
Descanso	8.62
Riverside 4 miles northwest	8.60
Corona	8.60
Anaheim	8.39
Placentia	8.22
Valley Center	8.19
Oceanside 2 miles northwest	7.91
Camp Pendleton	7.52
Los Alamitos	7.05
Santa Ana John Wayne Airport	6.90
Riverside Airport	6.77
March AFRB	6.75
Rancho Bernardo	6.47
Miramar	5.46
Carlsbad Airport	5.33
San Diego International Lindbergh Field	4.33
White Water	4.31
Palm Springs	3.60